

**SOFIE TROLL
&
STELLA TROLL**

V is for *V*IRUS





While being at home 12-year-old Sofie and 5-year-old Stella tried to understand what a virus is and why there is so much fuzz about COVID-19. In doing so they had some good fun that they would like to share with you.

**SOFIE TROLL
&
STELLA TROLL**

V is for VIRUS



To whom it may concern

On January 11th, 2020 we lost our granddad. He would have been 95 this year. When we travelled in February from Stockholm to Berlin to attend his funeral, we knew that something was coming our way. Life in Germany was still normal at that time. Only on our way back we saw at the Airport Berlin Schönefeld a few people who were wearing masks. We had an idea how much our life would change over the next couple of weeks and started to prepare.

When schools were closed in Germany our parents let us stay at home. It is now April. Schools in Sweden are still open and life seems to be pretty normal. We hope that the Swedish Authorities know what they are doing.

In this book we make some fun about Corona. We hope we get a giggle or even a laugh out of you. No offense to anybody.

We deeply and completely understand how loss feels.

Sofie & Stella
Uppsala, Sweden, April 2020

CORONA EVERYWHERE!

Everybody is talking about this Coronavirus.
WHAT'S ALL THE COMMOTION
ABOUT?!

It was at the end of 2019 when a new disease appeared in China. People who had visited a market where seafood and animals were sold, showed flu-like symptoms.

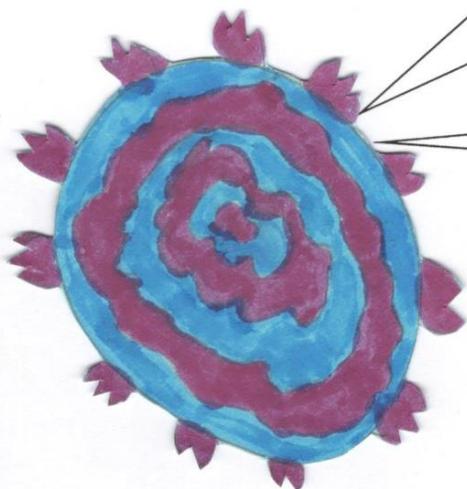
Did you ever have a Flu? Do you remember what it felt like? What were the side effects?

Ok it is not nice, but not that bad, isn't it?



BUT this new flu spread fast. And so China informed the World Health Organization that there might be a little problem.

Doctors found out the new disease was caused by a Coronavirus. Its surface shows one little crown next to another and therefore the name. This means that this sickness was in fact not a flu.



*MAY I INTRODUCE MYSELF?
CORONAVIRIDAE*

*I'M THE KING.
I DO MY THING.*

The new virus was labelled SARS-CoV-2 and the lung illness was named CoronaVirusDisease-2019. Or short COVID-19.

This coronavirus is such a busy bee that by March 2020 it had spread all over our planet. Even to the South Pole? Yes, even to the South Pole.



HOW COULD THIS HAPPEN?
For the moment we know only that most kids and younger people don't get really sick, BUT they might infect others who then might get really, really, really sick. And there lies probably a SECRET of Coronas success: COVID-19 is highly contagious. Imagine you might have the virus without even recognizing it.



*CONTAGIOUS?
YOU MEAN EFFICIENT?!*



WHAT CAN CAUSE A DISEASE?

A sickness or disease is usually caused by an infection where little critters invade your body and try to take over. These infections can be caused by BACTERIA, a FUNGUS or a VIRUS.



HEY BUDDY, COME
CLOSER! I THINK YOU
ARE MY NEW BEST
FRIEND!

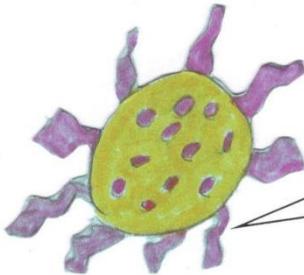
Your body is often able to detect invaders. Those so called antigens activate the production of antibodies in your body who can trap and destroy the invaders.

ARE WE THERE YET?



WHAT IS A VIRUS?

A virus is a type of germ. It is very tiny and when it gets inside your body, it can make you sick.



*PARDON ME,
A TYPE OF JERK?!*

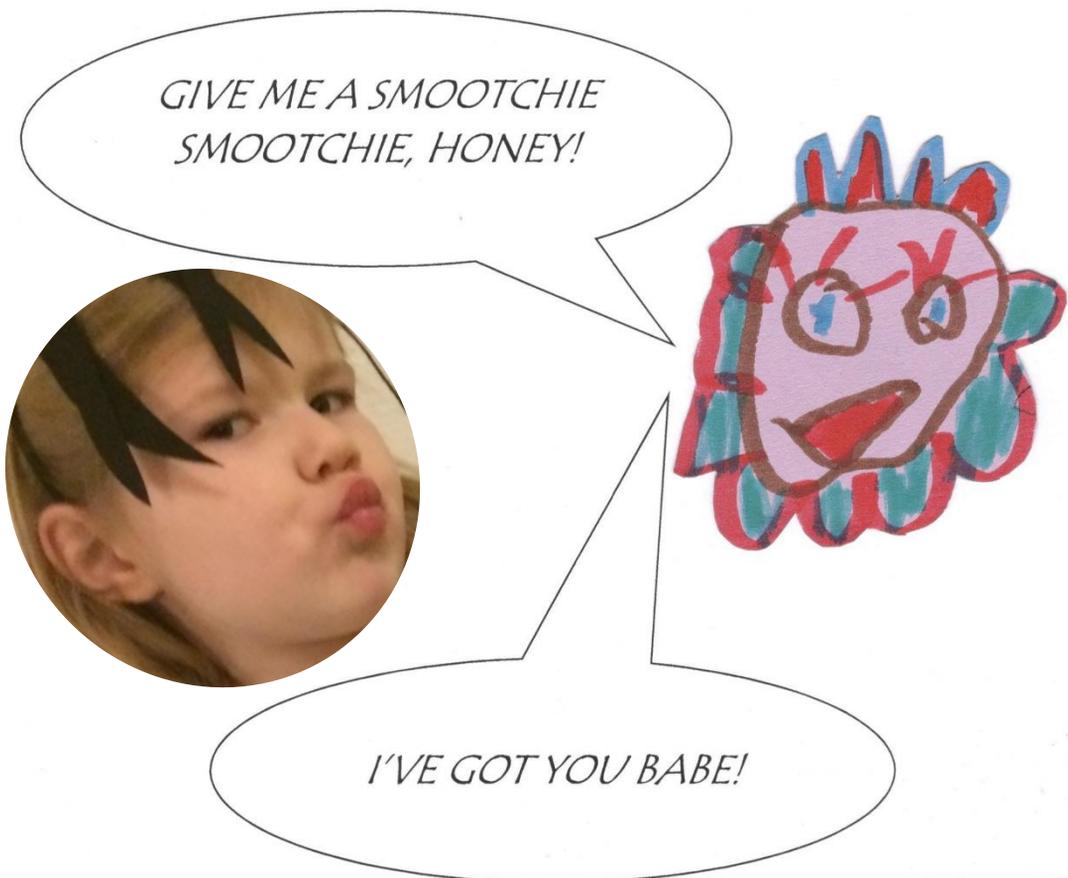
This very small micro-organism makes this by attacking and damaging cells. A cell is a tiny living unit. Billions of it make up your body.

Viruses cause Colds, Chicken Pox, Measles, Flu and many other diseases. Some viruses can stay inside your body long after your symptoms have gone. The virus that causes Chicken Pox for example lingers in the nerves and can erupt years later.

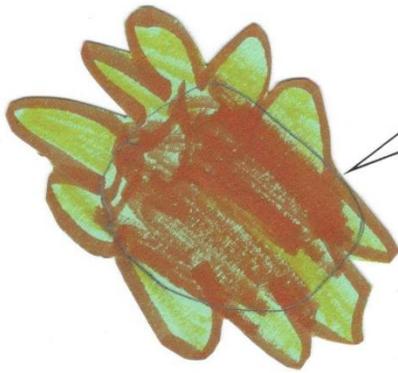


A virus can enter your body and then just stay there without any action for hours, days, weeks, months, even years.

There are viruses once you have them in your body you can never get rid of them again. Some of them can be harmful others just a little annoying.

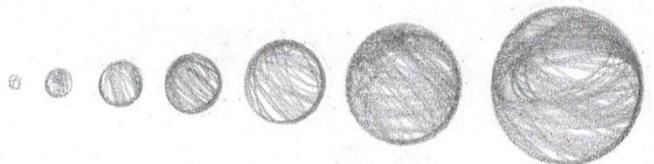


A SNEAKY LITTLE PARASITE



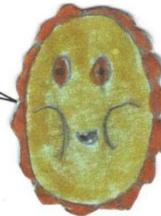
THANK YOU FOR THE
RESPECT...

Even though it seems that a virus is a very primitive organism, it is intelligent. Some would even argue that a virus is not even a living thing, because it depends on other living things to reproduce, which means it is too simple to be able to become more on its own.



Brainless they are, but yes, viruses somehow think!

Cogito, ergo sum.
I THINK SO I EXIST.



YES DARLING,
Descartes WAS SO RIGHT.



It is tricky for us to understand how they do it.

*AS IF YOU NEED A
BRAIN FOR THINKING.*



*YOU ARE RIGHT, HUMANS
ARE JUST HILARIOUS!*



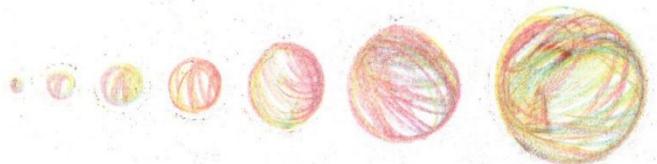
THE SPEEDY SPREADING PROCESS

or

GOING VIRAL!

Corona is a little scatterbrain. When it is replicating it does not check if it made an error. It just goes on replicating.

All viruses adapt all the time. That means they change themselves again and again and this is most likely another SECRET why Corona is that successful.



A virus can enter your body through your nose, your mouth, your skin or via an injection.



Imagine that this little virus has something similar to a key to unlock the viral receptors in your cells. That way it is able to slip inside and then command your cell.

Only this way it is possible for the virus to become more than one.

CELL SURFING

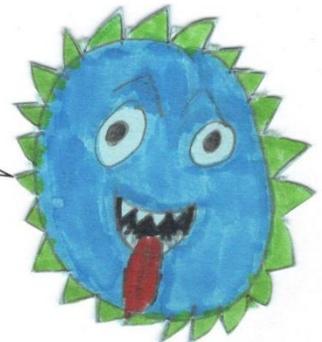
The virus exploits the reproductive machinery of your cell by inserting his own code. So your cell is not copying your code any longer it copies the code of the virus instead.

To make this process work the virus injects its own genetic material into one of your cells. Then it marks the cell as infected. That way the new viruses know that they don't need to invade this cell any longer.



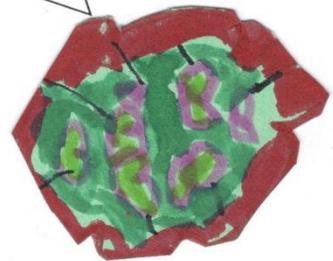
*WORK SMART,
NOT HARD!*

*YES, WE KNOW HOW TO
SPELL "EFFECTIVE".*



Some viruses use insects for transport. This was figured out by CARLOS FINLAY in 1881 when he recognized that mosquito bites caused Yellow Fever.

*I DON'T LIKE THIS FINLAY-MUCHACHO.
WE COULD BE SO MANY MORE
WITHOUT HIM!*



*YIHAA! COULDN'T
AGREE MORE.*

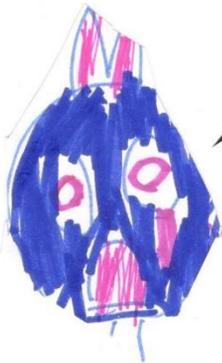


PREVENTION IS BETTER THAN CURE

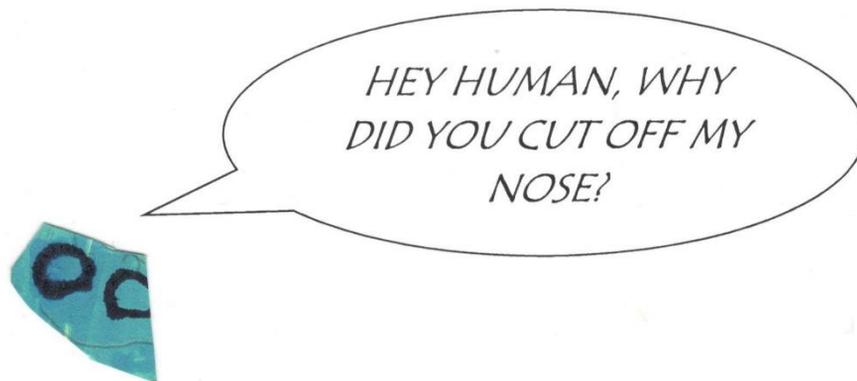
HOW ABOUT SOME MEDICINE
you might wonder? Antibiotics don't work on
viruses like they do on bacteria.

In the 1790s EDWARD JENNER invented
a new treatment called vaccine. His vaccine
stopped people from catching a deadly disease
called Smallpox.

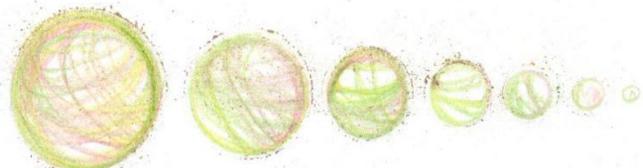
EDWARD,
GIVE ME
MY KEY BACK!



To create a vaccination a virus needs to be partly destroyed so that it still exists, but cannot harm a person. This new version of the virus will then be injected in your body or needs to be swallowed. Your body fights this way a much weaker virus, but still develops the necessary antibodies to kick-off the real virus whenever it comes.

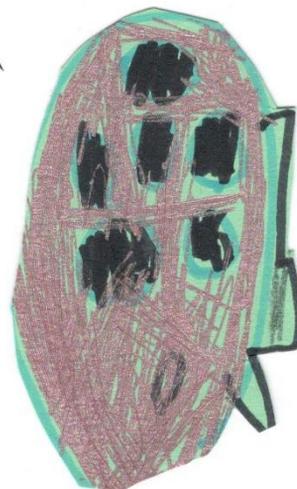
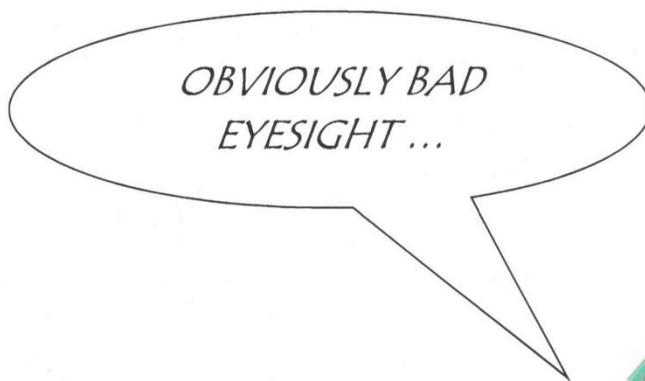


About hundred years later LOUIS PASTEUR developed a vaccine by growing the rabies virus in rabbits. He then dried the affected nerve tissue to weaken the virus. This way he was able in 1885 to save the life of a 9-year-old boy who was bitten by a rabid dog.



At that time Pasteur thought that he was dealing with a microbe because his microscope was not good enough to show the virus.

Jenner and Pasteur did not know that viruses existed.

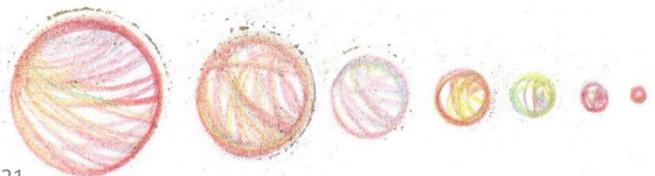


A DISEASE AGENT SMALLER THAN ANY KNOWN BEFORE

In 1892 DMITRI IVANOVSKY was able to present the first evidence that something like a virus exists.

The science of VIROLOGY developed and researchers discovered viruses in almost every environment on our planet like soil, the sea or inside our bodies.

But only in the 1930s Doctors were able to see viruses in action for the first time as the first electron microscopes were built.



It looks like that there are more viruses on Earth than stars in the sky.

Are there viruses in space?

We don't know yet. The field of Astrovirology is kind of unexplored.

Have viruses played a major role in the creation of life on Earth?

It is quite likely, but we don't know yet.

Can there be life on Earth without viruses?

Maybe, that's another thing we don't know yet.

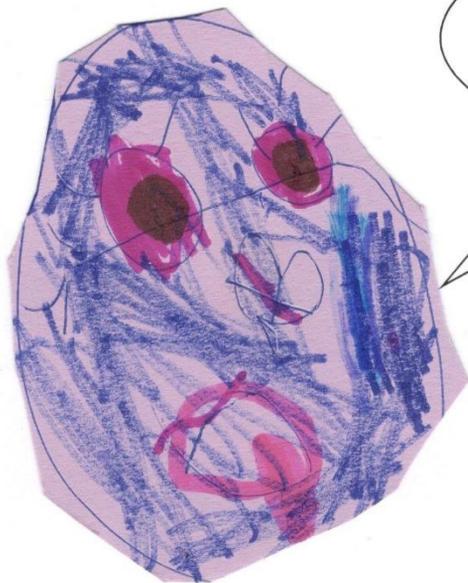


*STOP CALLING ME
TINY!*

HEALING

But back to you and the wonder how a vaccine works.

Once your body recognizes that it is sick it starts to produce large populations of immune cells so that you can recover. Doctors are even able to count these antibodies and how fast they reproduce. This enables them to figure out when you will be better.



*ANTIBODIES?
TOTALLY SICK IF YOU
ASK ME.*

Imagine it this way, when you have a cold your body produces slime, so that you start to sneeze and cough. With every sneeze and cough your body is able to get rid of viruses.



BLESS YOU!

*CHEERS TO THE JOY OF
BALLISTIC TRANSPORT.
THANKS!*

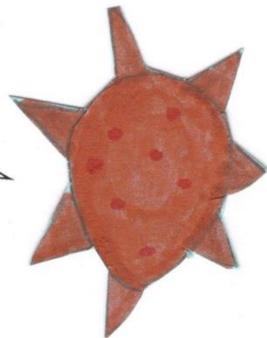


SO HOW ABOUT A CORONA- VACCINATION?

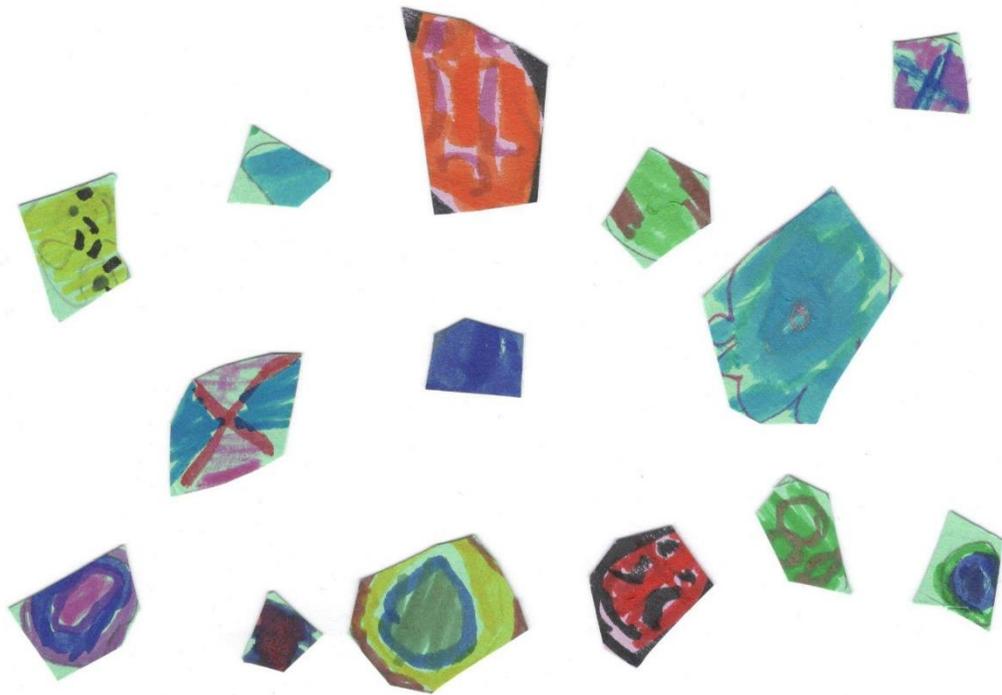
The coronavirus is a rule breaker and therefore it is not that easy to develop a vaccination.

Corona is most likely a product of natural evolution from human to human. So far researchers don't understand why it can make some people really sick while others get only a little cough or show even no symptoms of a disease.

IT IS I WHO WILL GIVE
YOU SICKNESS
HONEY.



This means that a silent transmission can happen, so that a person that looks and feels healthy can transmit the virus to another person, because it is carrying the nasty bugger in nose or throat and with every little cough or sneeze Corona is spreading. This way Corona gets the chance to invade many people in a fast time.



*THE QUEENS
SPECIAL COMMANDO*

Researchers try to develop ...

... a testing method that is fast, effective and cheap so that many people can be tested and the spreading can be slowed down,

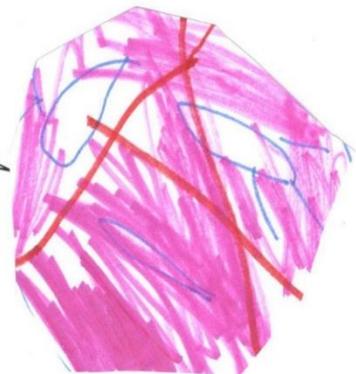
... a treatment for those that are infected,

... an anti-body-test so that we know who can resist the virus and

... a vaccination to prevent people from getting the disease at all.



*ARE YOU TALKING TO
ME?!*



THE INVENTION OF HAND WASHING

In 1847 IGNAZ SEMMELWEIS had already suggested that doctors and nurses should wash their hands before treating a patient to keep infections from spreading.

WHY ARE YOU DOING
THIS TO ME?

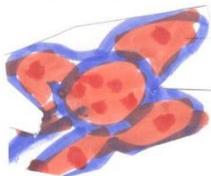


At first, people thought this hand-washing-idea was ridiculous, but ...

... around the same time FLORENCE NIGHTINGALE was pointing out that many men who were wounded in the Crimean War between 1854 and 1856 died often of diseases rather than their actual battlefield wounds. She recognized that the overcrowded dirty rooms might be the reason.

By the time Semmelweis died, in 1865, most doctors were following his advice.

So wash your hands often to help prevent the spread of viruses, especially before you eat and after you use the bathroom.



*AND DO NOT
LAUGH!*



*WE DON'T WANT
YOU TO BECOME
HEALTHY TOO SOON.*

If you happy and you know it wash your hands
If you happy and you know it wash your hands
If you happy and you know it and
you really want to show it
If you happy and you know it wash your hands.
And in case you are not happy, do it anyway
because it's good for everybody.

I BEG YOUR PARDON!





PS: **V** will always stand for **V**ICTORY. 😊

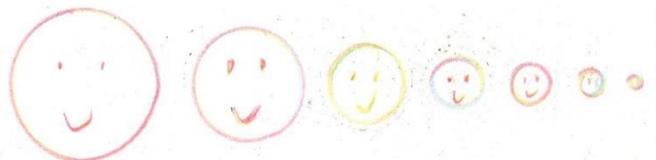
SOURCES:

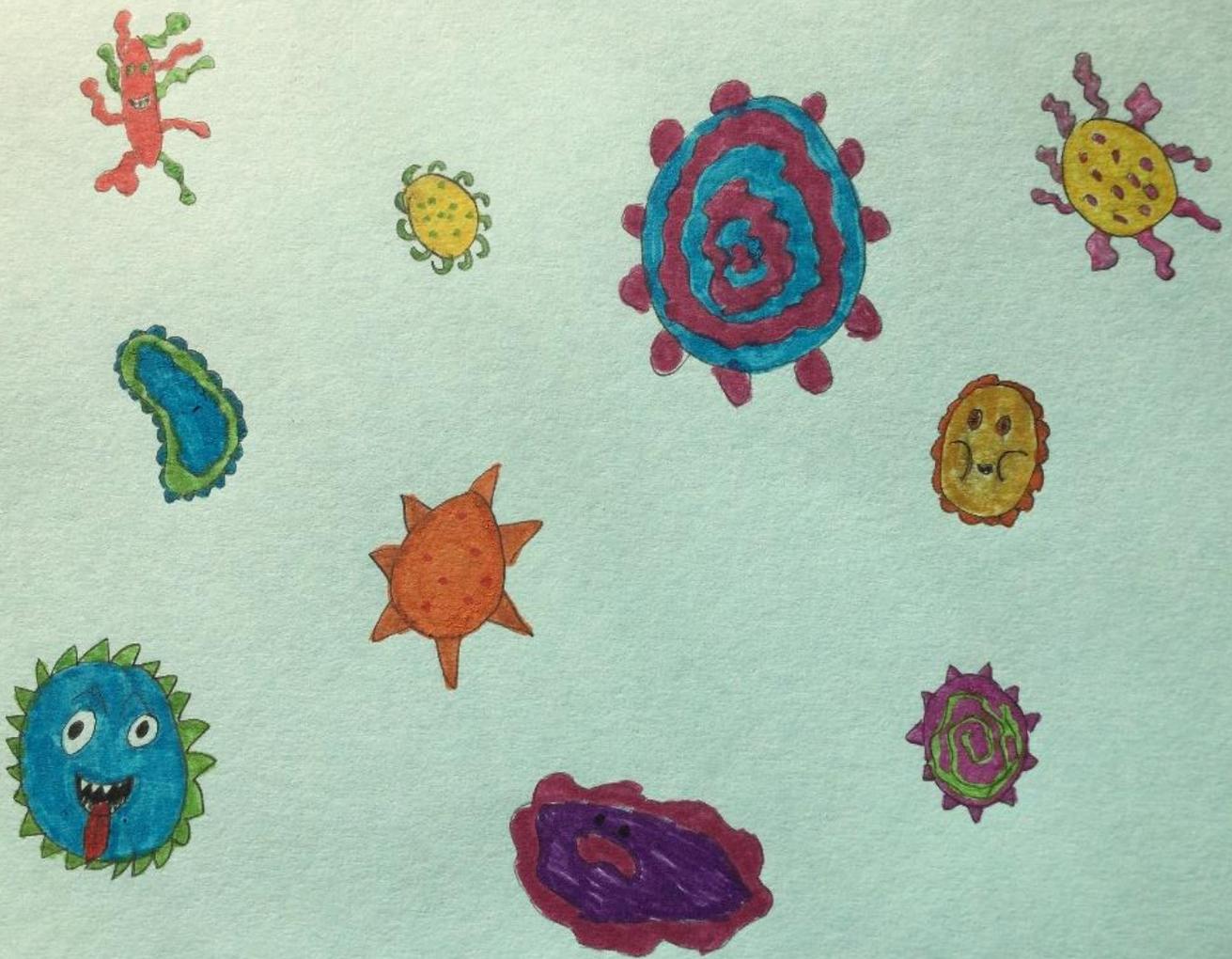
Lifescience.com

Usborne "The complete book of the Human Body"

Wikipedia

You Tube: The Dr Binocs Show | Peekaboo Kidz





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ILLUSTRATIONS: Stella Troll & Sofie Troll

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Stay Well!



The Troll Sisters are on **YouTube**.
Check out: **[Valentin Troll](#) | [Volcano-School](#)**